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Authors

Young, John

Leary, Mark

Dilley, James

et al.

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The Systems SOAP Note: A Systems Learning Tool

Fumi Mitsuishi,
University of California, San Francisco, San Francisco, CA, USA

John Q Young,
Hofstra North Shore LIJ School of Medicine, Glen Oaks, NY, USA

Mark Leary,
University of California, San Francisco, San Francisco, CA, USA

James Dilley, and
University of California, San Francisco, San Francisco, CA, USA

Christina Mangurian
University of California, San Francisco, San Francisco, CA, USA

Fumi Mitsuishi: fumi.mitsuishi@ucsf.edu

Abstract

Objective—Systems-based practice (SBP) is the only Accreditation Council for Graduate Medical Education (ACGME) competency concerned with public health and is relatively neglected in residency curricula. A tool was developed and pilot-tested to improve SBP learning on inpatient psychiatry rotations.

Methods—A four-step approach was used: (1) literature review, (2) expert consultation, (3) tool development, and (4) pilot testing on four cases and evaluation for completion time and preliminary efficacy.

Results—Out of 51 SBP articles, six (12%) focused on psychiatric residency programs, and none had a practical SBP learning tool. The "systems SOAP (subjective, objective, assessment, plan) note" (S-SOAP) was structured after a clinical SOAP note and was easy to use (mean completion time=60 min), and residents self-reported more insight into systems issues.

Conclusions—The S-SOAP tool was effectively integrated into clinical experience and provided insight into systemic complexities. Future research should assess SBP knowledge acquisition after the use of such tools.

Keywords

Systems-based practice; Systems learning; Educational tools

Systems-based practice (SBP) education is the last of six Accreditation Council for Graduate Medical Education (ACGME) core competencies. Its purpose is to encourage trainees to

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examine patient care from a systems or public health perspective, work collaboratively with interdisciplinary care teams, be sensitive to heath-care costs, and advocate for quality improvement. It requires learners to look beyond patient care, the first core competency, and to take on a macro-level lens into the system in which the care is provided. Given the focus on the individual in traditional apprenticeship-based clinical medicine teaching, it is challenging for trainees to learn about systemic issues and public health concerns. For example, SBP has been described as an "elusive" or "ambiguous" competency [1, 2].

First-year psychiatry residents (PGY-1s) in our program rotate on the inpatient psychiatric units at our county hospital for 6 months. Given the presence of systems challenges inherent to this safety net setting, we saw tremendous potential for SBP learning during this rotation. In this paper, we describe how we aligned systemic and curricular needs by developing a tool that could easily embed systems learning into everyday clinical work and transform this rotation into an enhanced SBP educational opportunity.

Development of the Systems-Based Practice Learning Tool

We took a unique four-step approach to develop and implement our tool: (1) literature review, (2) expert consultation, (3) development of tool, and (4) implementation and evaluation. Each of these steps is described in detail below.

Literature Review

A literature review of SBP learning tools and best practices in postgraduate medical education was conducted. PubMed was searched using MeSH terms organized into three groups: (1) "curriculum," "educational models", "competency-based education", or "educational tool" in the title (TI) and/or educational tool in the abstract (AB); (2) "systems based practice", "systems education," or "systems theory" in the TI or AB; and (3) "graduate medical education," "internship and residency," "medical residency," or "psychiatry education" in the TI or AB. Studies that included at least one of the terms in each of these groups were included. Inclusion criteria were the following: emphasis on SBP, description of curriculum or teaching tools, US program, and English language. Studies were excluded if they focused on theoretical concerns or another core competency. Titles, and then abstracts were examined to determine if they met inclusion/exclusion criteria. Citations of review articles meeting criteria were searched for missing references.

In all, 430 unduplicated articles were identified. Of these, 18 % (76/430) were found to be relevant based on the title. From the abstracts, 47% (36/76) of the studies fit the inclusion and exclusion criteria. Forty studies were excluded because they (1) did not describe specific curricula or teaching tools (*n*=14), (2) focused on theoretical concerns (*n*=11), (3) described foreign programs (*n*=3), or (4) focused on another core competency (*n*=12). The citations of two review articles [3, 4] were examined, and 15 additional articles were identified. Of the articles reviewed, only 12 % (6/51) focused on psychiatric residency programs (Table 1). Of these, 33% (two out of six) were published before ACGME delineated the core competencies (in 1999).

From this literature review, we identified several innovative strategies to teach SBP knowledge and skills, including (1) formal didactics [5], (2) mortality and morbidity conferences or root-cause analysis [1], (3) internet-based modules [6], (4) simulation exercises [7], and (5) quality improvement projects [8]. Many depicted experiential learning based on real-life problems in the system of one" s practice. None of the studies described the use of a simple tool to facilitate learning.

Expert Consultation

Semi-structured interviews of seven expert consultants were conducted to develop a sense of typical systemic problems from which residents could learn. All of our consultants had either leadership roles in the public mental health-care system or were seasoned clinicians working on the inpatient unit for several years.

From the consultations, we identified prolonged length of stay as an ideal systems issue that residents could learn from. Recent economic challenges have caused a dramatic decrease in inpatient beds at many safety net hospitals across the county. This has led to pressure from local public health departments to have hospitals discharge inpatients rapidly to the community [9]. Because these inpatients are frequently indigent and suffer from severe mental illness, their disposition options are often quite limited. Experts agreed that understanding the patient factors that limit options in the public mental health-care system would be important to include in any learning tool.

SBP Tool Development

Combining the findings from the literature review and expert consultations, we developed a tool that we called the systems SOAP (subjective, objective, assessment, plan) note (S-SOAP) (Fig. 1). The tool is an eight-item survey that intentionally includes several typical "barriers" to discharge into lower-level mental health care, including severe behavioral dysregulation (e.g., violence, impulsive behavior, chronic suicidality), psychiatric diagnoses (e.g., developmental delay, substance abuse disorder), medical diagnoses (e.g., traumatic brain injury, extensive medical needs), and legal issues (e.g., sex offender status). The S-SOAP tool also includes a "plan" to improve patient care through both clinical and systems solutions. This plan was included to encourage residents to grapple with the systemic complexities that influenced patient care and to brainstorm creative ways to work with their interdisciplinary team to develop solutions.

Pilot Testing and Evaluation

The SBP tool was pilot tested by a senior resident (PGY-4) and one PGY-1 on four cases with an inpatient psychiatry length of stay >60 days. Semi-structured interviews of the residents were conducted. Information on the time to complete the note, disposition barriers identified, and the lessons learned with this tool were gathered.

Overall, four S-SOAP notes were completed. Each took on average 60 min to complete (range 30"90 min). In these four cases, two consistent narratives explaining challenging placements were noted: (1) multiaxial problems and (2) violent behavior. Patients with a combination of severe medical and psychiatric issues were very difficult to place (e.g.,

schizophrenia and dementia). In one case, the patient was described as "a psychiatric patient in a SNF [skilled nursing facility] body", meaning that most disposition options were geared for either medically or psychiatrically ill patients, and this patient could not be accommodated. It became clear that our system lacked the flexibility needed for patients whose problems straddle the DSMaxes. For another patient with a prior history of long-term locked placement, re-admittance to several facilities was refused due to continued violent behavior in the hospital. After discussion with the patient and his providers, it was determined that the hospital environment (e.g., presence of particular patients, insufficient structured activities) was further escalating violent behavior. Notably, legal issues elicited from expert interviews (e.g., arson, sex offenders) were not reflected in this small sample surveyed.

The S-SOAP tool provided exposure to four of the six key components of SBP: (1) coordination of patient care, (2) cost awareness, (3) working in interdisciplinary teams, and (4) awareness of the larger context of health care. On occasion, simple solutions were identified by our tool to address some aspects of this complex systems issue. For example, behavioral plans to reduce violence on the unit were developed, patients were transferred to another floor to reduce likelihood of violence escalation, and medications were initiated to reduce violence. However, more typically, the complexity of the systemic issues was highlighted.

Some quotes exemplifying the resident experience of using S-SOAP include the following:

> "It took me out of my role as someone who feels frustrated by having my patient sitting on the unit for a long time, and gave me an appreciation for why this happens and consider other solutions…." —PGY-1

> "This tool helped me realize why someone became 'sticky' within the health care system." — PGY-4

> "Although this could be taught in a didactic format, the process of using S-SOAP helped me visualize my patient's path through the maze of our system of care…." —PGY-4

Discussion

To our knowledge, this is the first article to present a learning tool that can be easily implemented into an existing psychiatric clinical rotation to enhance SBP and systems knowledge. The S-SOAP tool highlights typical systemic problems for trainees and has a flexible and easy-to-use format that can enter the busy schedule of an inpatient service. As implied in its name, it is structured like a typical SOAP (subjective, objective, assessment, plan) note format. The format was selected intentionally to be conceptually and structurally easy to grasp and to encourage a methodical exploration of systems issues. Implied in this format is our belief that systems problems are comprised of both subjective and objective components that may be synthesized into an assessment, leading to a concrete problem-listed set of solutions.

There are several other potential applications for the S-SOAP tool. The tool could be applied as needed for difficult-to-place case on the service. For example, it could be used as a mechanism to allow residents to continue to learn from patients that are still hospitalized but are considered clinically stable (e.g. "rocks"). It may be used to anticipate disposition issues and may help trigger multidisciplinary discharge planning meetings to prevent unnecessary prolonged hospitalization. Lastly, it may be used as a quality improvement activity for trainees or administrators.

Limitations include the lack of generalizeability due to the small sample size, lack of randomization and control group, and the tool's time to completion, which may be a barrier for implementation.

Future studies might consider formally quantifying the impact of the S-SOAP tool upon trainee SBP knowledge. If found to be helpful, this curricular innovation could help enhance SBP training in other residency training programs.

In conclusion, systems learning is essential for providers of the future who will be called upon to innovate for higher-quality care for more people at a lower cost. As the health-care reform movement pushes for increased access to care, the problem of inadequate resources to meet high demand will be highlighted. Since an increasing proportion of psychiatrists are working in the public sector, they will have to grapple with these systems issues on a daily basis [10]. Tools like S-SOAP could help empower providers and prevent burnout by teaching them how to navigate complex systems, generate solutions, and provide systems education to their patients. Improving systems-based practice training will result in mental health providers who can be active participants in shaping the healthcare system of the future and advocate for high-quality care for our particularly vulnerable patient population.

Acknowledgments

References

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5. LeMelle S, Arbuckle MR, Ranz JM. Integrating systems-based practice, community psychiatry, and recovery into residency training. Acad Psychiatry. 2013; 37:35–37. [PubMed: 23338871]

6. Eskildsen MA. Review of web-based module to train and assess competency in systems-based practice. J Am Geriatr Soc. 2010; 58:2412–2413. [PubMed: 21070196]

7. Varkey P, Natt N, Lesnick T, et al. Validity evidence for an OSCE to assess competency in systems-based practice and practice-based learning and improvement: a preliminary investigation. Acad Med. 2008; 83:775–780. [PubMed: 18667895]

8. Arbuckle MR, Weinberg M, Cbaniss DL, et al. Training psychiatry residents in quality improvement: an integrated, year-long curriculum. Acad Psychiatry. 2013; 37:42–45. [PubMed: 23338873]

9. Shumway M, Alvidrez J, Leary M, et al. Impact of capacity reductions in acute public-sector inpatient psychiatric services. Psychiatr Serv. 2012; 63:135–141. [PubMed: 22302330]

10. Sowers W, Pollack D, Everett A, et al. Progress in workforce development since 2000: advanced training opportunities in public and community psychiatry. Psychiatr Serv. 2011; 62:782–788. [PubMed: 21724792]

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Implications for Educators

- This is a practical tool that helps incorporate systems learning into a busy clinical rotation.

- This tool aims to encourage learning from every day systems issues and even learning from patients who are considered to be medically stable, but whose care is affected by a systems issue.

- Basing the tool on the familiar concept and structure of the clinical SOAP note was helpful in breaking down and organizing a complex problem to produce potential solutions. This process may promote the learner's ability to find solutions and gain greater understanding when faced with complex systems issues.

Implications for Academic Leaders

- Systems learning is an important part of educating leaders of the future; it is an important task, given the changing landscape of health care and the challenge ahead to improve the quality of care while controlling cost.

- Current published data on SBP curricula and teaching tools indicate that this is a somewhat neglected part of medical curricula that is difficult to teach.

- This simple learning tool was effectively incorporated into a preexisting clinical rotation to teach SBP knowledge and transformed a clinical experience into a systems learning experience with minimal resources required.

Systems-SOAP Note

SUBJECTIVE: Through interviews of the patient, inpatient social worker/psychiatrist, placement team, and outpatient providers): Primary question asked is "**Why do you think that you/the pt has had a non-clinically-indicated extended length of stay (ELOS)**?

OBJECTIVE: Through chart review or interview

a. **Patient Characteristics:**
   Demographic/Social (age, gender, sexual orientation, ethnicity, primary language, financial support, housing status):

   Clinical:
   i. DSM-IV Multi-Axial diagnosis (from the chart):
      1. Axis I:
      2. Axis II:
      3. Axis III:
      4. Axis IV:
      5. Axis V:

   ii. Describe clinical contributors to ELOS:
      1. Severe behavioral dysregulation (*history of violence/threatening behavior, impulsivity, AWOL, chronic suicidality, sexually inappropriate behavior*):

      2. Psychiatric Diagnoses (*history of developmental delay, personality disorder, severe PTSD, substance abuse*):

      3. Medical Diagnoses (*history of traumatic brain injury, neurodegenerative illness*):

      4. Medical needs (*e.g. frequent labs, DM-related care, wound care, incontinence, dialysis, respiratory care*)
         ❑ Yes ❑ No

      5. Does the combination of contributors above pose a problem for placement?
         ❑ Yes ❑ No

b. **Legal Issues:**
   i. Current legal status:

   ii. History of prior psychiatric holds/conservatorship:

   iii. History of prior criminal arrests and past legal issues (*e.g. arson, sex offender status*):

c. **Timeline of placement attempts**

d. **Systems Issues:**
   i. **Structural issues that impede discharge** *(Characteristics of either the inpatient or outpatient settings, in terms of material resources, human resources, and organizational structure--staffing, reimbursement scheme that impede discharge). Think of structural elements that contribute to challenge in matching placement: gender, language, age, medical needs, HIV status, physical disability, behavioral redirection need, staff/pt ratio.*
   ii. **Process:** (e.g. inter agency communication problems, disagreement about placement, complexity of social work steps, worsened behavioral/medical issues on the unit leading to difficulty to place, problems with paperwork, patient and family preferences at odds with process)

ASSESSMENT AND PLAN

   -Formulation that summarizes major factors that contributed to ELOS
   -Generate additional hypotheses that may be tested
   -Generate recommendations to improve the system

Fig. 1.
The Systems SOAP (S-SOAP) note

Table 1

Residency strategies for teaching SBP

	Source	Residency training program	Curricular innovation	Practical tool for SBP learning
1	Allen E, et al: Teaching systems-based practice to residents by using independent study projects. Acad Med. 2005	Internal medicine	Addition of independent study project to didactic curriculum on systems	None
2	Amin AN, et al: A systems-based practice curriculum. Med Educ. 2004	Internal medicine	Workshop on continuous QI methods, followed by group-based faculty mentor-sponsored QI project initiation	None
3	Arbuckle MR, et al: Training psychiatry residents in quality improvement: an integrated, year-long curriculum. Acad Psychiatry. 2013	*Psychiatry*	PGY-3 QI curriculum with year-long group QI project evaluated using modified QIKAT (QI Knowledge Assessment Tool)	None
4	Brauzer B, et al: A module for training residents in public mental health systems and community resources. Psychiatr Serv. 1996	*Psychiatry*	Six-month module with weekly site visits to community program	None
5	Carbo AR, et al: Developing a high-performance team training framework for internal medicine residents: the ABC'S of teamwork. J Patient Saf. 2011	Internal medicine	High-performance teamwork training to improve quality	None
6	Colbert CY, et al: The patient panel conference experience: what patients can teach our residents about competency issues. Acad Med. 2009	Internal medicine	Residents attend conference where patients speak about their experience with health-care services and write reflection pieces about how this affects their practice and thoughts about the system	None
7	Cutler DL, et al: Training psychiatrists to work with community support systems for chronically mentally ill persons. Am J Psychiatry. 1981	*Psychiatry*	Four-year curriculum with exposure to case management skills and systems knowledge during state hospital rotation	None
8	Delphin E, et al: Teaching and evaluating group competency in systems-based practice in anesthesiology. Anesth Analg. 2008	Anesthesiology	Didactics linked to QI project using Plan-Do-Study-Act (PDSA) cycle to improve medication reconciliation process	None
9	Daniel DM, et al: Taking a unified approach to teaching and implementing quality improvements across multiple residency programs: the Atlantic Health experience. Acad Med. 2009	Internal medicine	Monthly SBP and managed care workshop followed by summative assessment of SBP learning objectives	None
10	Doezema D, et al: An approach to fulfilling the systems-based practice competency requirement. Acad Emerg Med. 2002	Emergency medicine	Three-year curriculum starting with introduction to community resources and leading up to community project	None
11	Eiser AR, et al: Experiential learning of systems-based practice: a hands-on experience for first-year medical residents. Acad Med. 2008	Internal medicine	PGY-1 2-week experience with seminars led by leaders from non-MD disciplines, such as hospice care, pharmacy, laboratory, utilization, and nutrition	None
12	Ellrodt AG. Introduction of total quality management (TQM) into an internal medicine residency. Acad Med. 1993	Internal medicine	Residency program restructuring to integrate health services research and resource management departments and provide residents with more power to change their own system and education	
13	Englander R, et al: Teaching residents systems-based practice through a hospital cost-reduction program: a "win-win" situation. Teach Learn Med. 2006	Pediatrics	Involvement of residents in process of system redesign to decrease laboratory costs	None
14	Eskildsen MA. Review of web-based module to train and assess competency in systems-based practice. J Am Geriatr Soc. 2010	Internal medicine	Web- and case-based module that walks learner through out of hospital disposition process of elderly patient	None
15	Fiebach NH, et al: A curriculum in health systems and public health for internal medicine residents. Am J Prev Med. 2011	Internal medicine	Week-long didactic curriculum on health policy/economics, insurance, cost issues, legal medicine, public health, and local health initiatives	None

	Source	Residency training program	Curricular innovation	Practical tool for SBP learning
16	Frey K, et al: The 'Collaborative care' curriculum: an educational model addressing key ACGME core competencies in primary care residency training. Med Educ. 2003.	Family medicine	Resident led projects to develop, implement, and evaluate practice guidelines for specific diseases	None
17	Goldman S, et al: Psychiatry morbidity and mortality rounds: implementation and impact. Acad Psychiatry. 2009	*Psychiatry*	Interdisciplinary M&M rounds at a children's hospital followed by yearly attendee survey to gauge educational value	None
18	Halverson LW, et al: A residency clinic chronic condition management quality improvement project. Fam Med. 2007	Family medicine	QI project focused on chronic condition management	None
19	Hauge LS, et al: Web-based curriculum improves residents' knowledge of health care business. J Am Coll Surg. 2010	General surgery	Web-based modules to teach health-care business concepts	None
20	Herbitter C, et al: Abortion training at multiple sites: an unexpected curriculum for teaching systems-based practice. Teach Learn Med. 2010	Family medicine	Abortion training helps teach failures of larger system to meet patient reproductive needs	None
21	Holland R, et al: Creating champions for health care quality and safety. Am J Med Qual. 2010	Internal medicine	Month-long curriculum with web-based module, QI project, and presentation of project to entire department	None
22	Kim CS, et al: Teaching internal medicine residents quality improvement and patient safety: a lean thinking approach. Am J Med Qual. 2010	Internal medicine	Resident team-based project to evaluate and improve in-hospital response to cardiopulmonary arrest	None
23	Kirkegaard M, et al: Doc-U-drama: using drama to teach about patient safety. Fam Med. 2004	Family medicine	Using dramatic simulation of medical errors as teaching tool for residents and other hospital providers	None
24	Kirsh SR, et al: Integrating the chronic-caremodel and the ACGME competencies: using shared medical appointments to focus on systems-based practice. Qual Saf Health Care. 2008	Internal medicine	Incorporating "shared medical appointment" for chronically medically ill patients to improve health outcomes by increasing interdisciplinary team work	None
25	Kravet SJ, et al: Morbidity and mortality conference, grand rounds, and the ACGME's core competencies. J Gen Intern Med. 2006	Internal medicine	Emphasizing the educational component on M&M grand rounds to teach SBP	None
26	Kravet SJ, et al: Teaching resource and information management using an innovative case-based conference. J Gen Intern Med. 2001	Internal medicine	Interdisciplinary conference to teach resource and information management in the hospital	None
27	Larkin AC, et al: Human emotion and response in surgery (HEARS): a simulation-based curriculum for communication skills, systems-based practice, and professionalism in surgical residency training. J Am Coll Surg. 2010	General surgery	Curriculum focused on stress management and effective communication, train residents in attitudes helpful in teamwork	None
28	LeMelle S, et al: Integrating systems-based practice, community psychiatry, and recovery into residency training. Acad Psychiatry. 2013	*Psychiatry*	Four-year curriculum that includes didactics, clinical rotations, presentations, supervision focused on SBP and recovery principles, and site visits	None
29	Marinaro J, et al: Resident guideline development to standardize intensive care unit care delivery: a competency-based educational method. J Surg Educ. 2008	Emergency medicine	Resident-driven evidence-based patient care guidelines in trauma intensive care unit	None
30	Matter CA, et al: Hospital to home: improving internal medicine residents' understanding of the needs of older persons after a hospital stay. Acad Med. 2003	Family medicine	Home visits to recently discharged elderly patients bring awareness about outcomes of discharge	None
31	McGinty KL. Training child and adolescent psychiatrists for systems of care. Psychiatr Serv. 2003	*Psychiatry*	Incorporating "systems of care" principles into child and adolescent psychiatry didactic and clinical curriculum (e.g., focus on partnership with patient families, caregiver stress, interdisciplinary collaboration)	None

	Source	Residency training program	Curricular innovation	Practical tool for SBP learning
32	Mohr JJ, et al: Integrating improvement competencies into residency education: a pilot project from a pediatric continuity clinic. Ambul Pediatr. 2003	Pediatrics	Resident team QI project for vaccination clinic led to improved immunizations rate	None
33	Nabors C, et al: A multidisciplinary approach for teaching systems-based practice to internal medicine residents. J Grad Med Educ. 2011	Internal medicine	Administrative internship where learner interacts with non-MD personnel leadership to organize QI initiatives	None
34	Oyler J, et al: Teaching internalmedicine residents quality improvement techniques using the ABIM's practice improvement modules. J Gen Intern Med. 2008	Internal medicine	Two mandatory 1-month ambulatory rotation using existing learning module for QI project	None
35	Peters AS, et al: A self-instructional model to teach systems-based practice and practice-based learning and improvement. J Gen Intern Med. 2008	Internal medicine	Four-week clinical elective comprised of didactics, web-based material, and QI project	None
36	Schwengel DA, et al: A novel approach to implementation of quality and safety programs in anaesthesiology. Best Pract Res Clin Anaesthesiol. 2011	Anesthesiology	Longitudinal curriculum on patient safety based on non-didactic small group learning	None
37	Siri J, et al: A multidisciplinary systems-based practice learning experience and its impact on surgical residency education. J Surg Educ. 2007	General surgery	Quality parameter assigned to group of residents tasked to formulatemanagement approach based on review of literature, with results presented to multidisciplinary QI meeting	None
38	Tomolo A, et al: The outcomes card.Development of a systems-based practice educational tool. J Gen Intern Med. 2005	Internal medicine	Didactics followed by filling out reflection cards on two self-identified cases involving 25 patient safety issues. This "outcome card" was a reflection piece, not a practical tool	None
39	Turley CB, et al: Systems survivor: a program for house staff in systems-based practice. Teach Learn Med. 2007	Pediatrics, internal medicine, ophthalmology, otolaryngology	Five-day rotation based on "game show" model where residents experience illustration of patient revenue cycle	None
40	Varkey P, et al: A systems approach for implementing practice-based learning and improvement and systems-based practice in graduate medical education. Acad Med. 2009	Various	Survey of 115 residency programs looking at curriculum type to teach SBP components; 71 % found to be QI project	None
41	Varkey P, et al: Validity evidence for an OSCE to assess competency in systems-based practice and practice-based learning and improvement: a preliminary investigation. Acad Med. 2008	Preventive and occupational medicine	Eight-station OSCE experience at the end of 3-week QI curriculum helped learner demonstrate skills learned rather than test knowledge	None
42	Varkey P, et al: An experiential interdisciplinary quality improvement education initiative. Am J Med Qual. 2006	Preventive medicine, family medicine, and internal medicine	Four-week QI rotation leading up to QI project for medication reconciliation	None
43	Vinci LM, et al: Effect of a quality improvement curriculum on resident knowledge and skills in improvement. Qual Saf Health Care. 2010	Internal medicine	Validation of American Board of Internal Medicine Practice Improvement Module and QI Knowledge Assessment Measure	None
44	Voss JD, et al: Changing conversations: teaching safety and quality in residency training. Acad Med. 2008	Internal medicine	Two-year curriculum on QI with focus on systems thinking, human factor analysis, root-cause analysis, and process mapping	None
45	Voss JD, et al: The Clinical Health Economics System Simulation (CHESS): a teaching tool for systems-and practice-based learning. Acad Med. 2005	Internal medicine	A computerized team-based competitive simulator to teach principles and practical application of health economics	None
46	Wang EE, et al: Addressing the systems-based practice core competency: a simulation-based curriculum. Acad Emerg Med. 2005	Emergency medicine	Case-based simulation exercises help highlight emergency medicine specific SBP skills	None
47	Weingart SN, et al: Creating a quality improvement elective for medical house officers. J Gen Intern Med. 2004	Internal medicine	Three-week elective in QI to teach QI concepts, familiarize with existing hospital QI	None

	Source	Residency training program	Curricular innovation	Practical tool for SBP learning
			infrastructure, and learn QI methods such as root-cause analysis	
48	Weingart SN. A house officer-sponsored quality improvement initiative: leadership lessons and liabilities. Jt Comm J Qual Improv. 1998	Internal medicine	Grassroots QI projects supported by residency program and led by residents	None
49	Wittich CM, et al: Residents' reflections on quality improvement: temporal stability and associations with preventability of adverse patient events. Acad Med. 2011	Internal medicine	Use of reflection tool on patient care adverse events experienced by residents. MERIT (Mayo Evaluation of Reflection on Improvement Tool) was used as reflection not as practical tool to elucidate systems issues	None
50	Zenni EA, et al: Awalk in the patients' shoes: a step toward competency development in systems-based practice. Ambul Pediatr. 2006	Pediatrics	Scenario-based learning where residents take the role of a parent facing complex life challenges and need to access resources	None
51	Ziegelstein RC, et al: "The mirror" and "the village": a new method for teaching practice-based learning and improvement and systems-based practice. Acad Med. 2004	Internal medicine	Use of M&M conference, QI projects, multidisciplinary patient care rounds to teach SBP components	None

Articles describing studies curricular innovations implemented in Psychiatry Residency Training Programs highlighted in italics *QI* quality improvement, *M&M* mortality and morbidity